

# Tennessee's Threatened and Endangered Insects

By Steve Murphree and Andrea English



The Orange Shadowdragon.  
*Photo Courtesy of the Dept. of Entomology,  
Texas Ag Exp. Station*

What insect could be threatened, even endangered among the innumerable hordes known to occur in Tennessee's state parks and natural areas? Are there really bugs that could become locally extinct if they are not protected?

Besides all that, shouldn't we only use our resources to protect majestic, aesthetically pleasing wildlife like American elk rather than bizarre-looking bugs?

While insects make up more than 70 percent of global animal diversity, only four percent of the endangered animal species listed by the U.S. Fish and Wildlife Service are insects. Granted, many visitors of our state parks and natural areas do not go to see the insects and some may leave with misgivings about all insects after encounters with truly annoying species such as mosquitoes. However, even if you cannot get past the "disgust factor" insect species are integral parts of food chains and food webs that also include many birds and mammals.

Taking measures to protect rare insect habitats also benefits the larger vertebrate species that people associate with nature. No different from threatened and endangered vertebrate species, the unique features of the habitats in which they occur make them truly rare.

Tennessee is well known for its many distinct landscape regions, each containing its own diversity of insect species. In addition, endangered insects often perform unique ecosystem functions, such as feeding on particular kinds of wood, dung, or carrion. When you take a closer look at the "world of the small" you may find that Tennessee's threatened and endangered insects, even those that many will never see, are beautiful in their own way.

## How is Rareness Defined?

Plants and animals are assigned ranks based upon their rareness.

They are given a state rank (S) by state natural heritage programs and they are assigned a global rank (G) by NatureServe, a non-profit conservation organization that provides the scientific information and tools needed to help guide effective conservation action.

NatureServe represents an international network of biological inventories—known as natural heritage programs or conservation data centers—operating in all 50 U.S. states, Canada, Latin America and the Caribbean. Tennessee's Natural Heritage Program is within the Natural Areas Division of the Tennessee Department of Environment and Conservation ([www.tdec.net/nh](http://www.tdec.net/nh)).

Basically, the lower the numerical rank the rarer a species is considered to be. This rareness is based on the number of times that individuals of a species have been seen or heard or the number of occurrences that have been recorded or documented for the species. The following are the guidelines

for G and S ranks:

### **Natural Heritage Program Global and State Ranking System for Species**

#### Global Ranks:

G1 = critically imperiled globally; 5 or fewer occurrences worldwide  
 G2 = imperiled globally; 6 to 20 occurrences worldwide  
 G3 = very rare or restricted throughout range; 21 to 100 occurrences worldwide  
 G4 = apparently secure globally though locally rare sometimes; 100 to 1,000 occurrences Worldwide  
 G5 = demonstrably secure globally; over 1,000 occurrences worldwide  
 GH = historic global occurrence; possibly extinct  
 GNR = not ranked currently at global level

#### State Ranks:

S1 = critically imperiled in state; 5 or fewer occurrences statewide  
 S2 = imperiled within state; 6 to 20 occurrences statewide  
 S3 = rare and uncommon in state; 21 to 100 occurrences statewide  
 S4 = apparently secure globally though locally rare sometimes; 100 to 1,000 occurrences statewide  
 S5 = demonstrably widespread and secure in the state  
 SH = historical occurrence in state  
 SNR = not ranked currently at state level  
 SP = potentially occurs in state  
 SR = reported to occur in state  
 SX = believed extirpated from state

### **Rare Insect Numbers in Tennessee**

Currently, the Natural Heritage Division of the Tennessee Department of Conservation includes 144 species of insects on Tennessee's rare animal list. Of these, only the American Burying Beetle, *Nicrophus americanus*, is listed as endangered. The American Burying Beetle is federally endangered, which means it is endangered throughout the United States. Most insects on the list are S1S2/G1G2. This means they are rare both statewide and globally.

Other insect species on the rare animal list include 22 carabid or ground beetle species (all in the genus *Trechus*) and 52 cave beetle species. Some cave beetles occur in only one cave and are often named after the cave where they occur such as the Ace in the Hole Cave Beetle. Fourteen springtails are considered rare in Tennessee. According to the Audubon Field Guide to North American Insects and Spiders, springtails are named for a special leaping organ, or furcula, that is folded forward under the insect and held by a catch. When the catch is released the insect is sprung into the air. These are tiny, wingless insects that can sometimes be seen in winter at the base of trees on the snow.

Other rare insects in Tennessee include rove beetles and many aquatic insects like caddisflies, mayflies, stoneflies, and dragonflies. The vignettes below highlight just a few of the many rare insects known from Tennessee.

### **The American Burying Beetle (G2G3/SH)**

*Nicrophorus americanus*, the rarest of rare insects in Tennessee, is a striking insect best observed at a distance. This is not because it is dangerous species but because it smells like the dead animals or carrion that it busily buries to provide nourishment for its developing larvae.

The burying behavior of *N. americanus* and other carrion beetles is thought to keep certain fly and ant species from reaching pest proportions. Entomologists who conduct insect surveys must be careful not to pop individuals of this species into a killing jar. Thankfully, it can easily be distinguished from other more common species in the genus *Nicrophorus* by its larger size and its prominent orange-red pronotum, the top part of its exoskeleton just behind its head (other species of *Nicrophorus* have a dark brown pronotum).

The American Burying Beetle was last collected in Tennessee over 50 years ago in the disjunct areas of Cumberland County on the Cumberland Plateau and Madison County in west Tennessee. No systematic surveys of the state have been conducted in search of this rare and rather smelly beetle so it might still be out there performing its gravedigger duties.

### **An Obligate Cave Beetle (G3/S3)**

Unlike many cave beetles, *Nelsonites walteri* occurs in more than one cave but then only in small populations. It occurs in caves along the western edge of the Cumberland Plateau in Tennessee extending northeast from Fall Creek Falls State Park in Van Buren County through White, Putnam, Overton and Fentress Counties.

*Nelsonites walteri* is large by cave beetle standards, reaching 7.5 mm in length with antennae as long as its body. Its disproportionately large mandibles are thought to be useful in catching juvenile cave crickets as they pass by in the total darkness where these obligate cave species or troglobites exist.

The uniformly cool temperatures within Tennessee's caves became refuges for *Nelsonites walteri* and other troglobites as the last Ice Age gave way to warmer surface temperatures.

Since it occurs in small populations, this cave beetle is threatened by heavy use of caves by spelunkers as well as polluted surface water that flows through the caves.

### **The Diana Fritillary Butterfly (G3/S3)**

*Speyeria diana* is a member of the large Family Nymphalidae or brush-footed butterflies. According to the Peterson Field Guide to Insects, fritillaries are medium-sized to large butterflies, brownish with numerous black spots or narrow bands on the wings, and usually with silvery spots on the underside of the hind wings.

In Tennessee, Diana Fritillaries can be found only in the eastern counties of Carter, Cocke, Monroe, and Polk, which border North Carolina. In the Handbook for Butterfly Watchers by Robert Mitchell Pyle, the Diana female is described as deep-blue in color and the male "Halloween-colored."

In parts of its range the Diana Fritillary is threatened by the spraying of insecticides for the Gypsy Moth. Bruce Anderson, the assistant regional supervisor in the Tennessee Wildlife Resource's Region 3, says that Dianas are associated with violets and forest edge habitats. He has observed that the males come out on the Cumberland Plateau in early to mid-June and the females seem to come out later. The males disappear after a couple of weeks but the females are around until late August or early September. The females lay eggs on debris near violets. The caterpillars hatch, overwinter without feeding, and then emerge and feed on the violets in the spring. They are apparently obligate feeders on violets. Interestingly, the caterpillars of the Great-spangled Fritillary (*Speyeria cybele*) a common fritillary throughout Tennessee, also feed only on violets.

### **The Frosted Elfin Butterfly (G3/S2S3)**

*Callophrys irus* is a petite butterfly with a wingspan of only one inch. It is a member of the family Lycaenidae or gossamer-winged butterflies and is also a member of the hairstreak subfamily since it has a pair of fine tails on its hind wings.

The Frosted Elfin got its name because the margins of the hind wings have a "frosted" appearance. This species has only been found in Madison County in west Tennessee. Its habitat is rocky or acidic areas cleared by fire or by humans (e.g., power line cuts and railroad right-of-ways). It is also found in open woods and forest edges and the caterpillars feed exclusively on the flowers and developing seedpods of plants in the pea family like wild indigo and lupine. Interestingly, grazing deer are a major threat to the Frosted Elfin because they feed on this species' host plants.

### **The Tennessee Snaketail Dragonfly (G3/S2)**

One of eight rare dragonflies in the state, the Tennessee Snaketail Dragonfly, *Ophiogomphus*

acuminatus, is a beautiful member of the dragonfly family Gomphidae or clubtails. This showy, big-eyed predator was highlighted by Jerry Lee Hutchens in the March/April 1996 issue of this publication. The immatures of the Tennessee Snaketail make it rare since they prefer to hunt prey in the gravel/sand-filled cracks in limestone found in creeks of the Highland Rim. It has been found in seven Tennessee counties and Montgomery Bell State Park. The Tennessee Snaketail is threatened by logging along streams in some areas.

Most visitors to Tennessee's state parks and natural areas would not willingly contribute to the extinction of any wild species, even an insect. The word "extinction" certainly connotes a sense of finality on a planet still thriving with living organisms but, so far as we have been able to determine, all living things are rare and precious in this corner of the universe.

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